

We claim:

1. An antenna for a wireless device, comprising:  
a ground plane;  
a radiating element;  
5 the radiating element comprising a first conductive strip having a first end and second end such that a gap exists between the first end and the second end and the conductive strip forms a loop antenna;  
a dielectric space residing between the ground plane and the radiating element;  
10 a shorting element;  
the radiating element comprises at least one non radiating edge and at least one radiating edge;  
the shorting element residing on a non radiating edge of the radiating element and extending from the radiating element to the ground plane;  
15 a feed tab, and  
the feed tab residing on the non radiating edge of the radiating element and extending from the radiating element towards the ground plane.
2. The antenna according to claim 1, wherein the loop antenna forms a geometric pattern.
- 20 3. The antenna according to claim 2, wherein the geometric pattern is at least one of a rectangular shape, a circular shape, a square shape, an elliptical shape, an oval shape, and a polygonic shape.
4. The antenna according to claim 1, wherein the dielectric space comprises at least one of an air gap and a dielectric carriage.
- 25 5. The antenna according to claim 1, further comprising:  
at least one capacitive loading plate residing on the radiating edge of the radiating element.
6. The antenna according to claim 1, further comprising:

at least one shorting post residing on the non radiating edge of the radiating element.

7. The antenna according to claim 5, further comprising:  
at least one shorting post residing on the non radiating edge of the  
5 radiating element.

8. The antenna according to claim 1, further comprising:  
at least one matching stub residing on the radiating element.

9. The antenna according to claim 8, wherein the at least one  
matching stub resides on a radiating edge of the radiating element.

10 10. The antenna according to claim 1, wherein the radiating element  
comprises at least one second conductive strip and at least a portion of the at  
least one second conductive strip is surrounded by the first conductive strip.

11. The antenna according to claim 10, wherein the at least one second  
conductive strip resides substantially adjacent a non-radiating edge of the first  
15 conductive strip.

12. The antenna according to claim 10, wherein the at least one second  
conductive strip extends into the gap formed by the first conductive strip.

13. The antenna according to claim 10, further comprising a connection  
between the first conductive strip and the at least one second conductive strip.

20 14. The antenna according to claim 10, wherein the at least one second  
conductive strip comprises a geometric shape.

15. The antenna according to claim 10, wherein the at least one second  
conductive strip comprises a meanderer line.

25 16. The antenna according to claim 10, further comprising at least one  
of at least one capacitive loading plate and at least one shorting post.

17. The antenna according to claim 1 operating at a quarter  
wavelength.

18. The antenna according to claim 10 operating at a quarter wavelength.

19. The antenna according to claim 1 wherein the shorting element is substantially proximate at least one of the first end and the second end.

5 20. The antenna according to claim 1 wherein the shorting element is located adjacent at least one of the first end and the second end.

21. The antenna according to claim 1 wherein the gap is parallel a major axis of the ground plane.

10 22. The antenna according to claim 1 wherein the gap is parallel a minor axis of the ground plane.

23. The antenna according to claim 21 wherein the gap also is parallel a minor axis of the ground plane forming an L shape.

24. The antenna according to claim 1 wherein both the shorting element and the feed tab are located proximate the first end.

15 25. The antenna according to claim 1 wherein both the shorting element and the feed tab are located proximate the second end.

20 26. The antenna according to claim 8 wherein the at least one matching stub resides on a radiating edge that is opposite to the non radiating edge of the radiating element such that the at least one matching stub is entirely internal to a geometry of the radiating element.

27. A multi band antenna, comprising:
- a ground plane;
  - a first radiating element comprising a first conductive strip, the first conductive strip having a radiating edge opposite a non-radiating edge and a first end and a second end, the first conductive strip is formed into a loop such that the first end and the second end form a gap;
  - a second radiating element comprising a second conductive strip arranged such that a portion of the second radiating element resides internal to the loop formed by the first conductive strip;
  - a feed tab;
  - a shorting element; and
  - a connector joining the first radiating element to the second radiating element.
28. The antenna according to claim 27, wherein the entire second radiating element resides internal to the loop formed by the first radiating element.
29. The antenna according to claim 27, wherein the second radiating element comprises a plurality of internal radiating elements.
30. The antenna according to claim 27, wherein the second radiating element resides substantially adjacent the non-radiating edge of the first conductive strip.
31. The antenna according to claim 27 wherein the ground plane is separated from the first radiating element and the second radiating element by a dielectric space.
32. The antenna according to claim 31, wherein the dielectric space is at least one of air and a dielectric carriage.

33. The antenna according to claim 27, further comprising at least one capacitive loading plate, at least one shorting post, and at least one matching stub.

34. The antenna according to claim 33, wherein the at least one  
5 capacitive loading plate resides on the radiating edge of the first conductive strip.

35. The antenna according to claim 33, wherein the at least one shorting post resides on the non radiating edge of the first conductive strip.

36. The antenna according to claim 33, wherein the at least one  
10 matching stub resides on the non-radiating edge of the first conductive strip.

37. The antenna according to claim 27, wherein the loop is one of a geometric or irregular shape.

38. The antenna according to claim 37, wherein the geometric shape is at least one of a rectangle, a square, a circle, an oval, an ellipse, and a polygon.

39. The antenna according to claim 27, wherein the first conductive  
15 strip comprises a plurality of widths.

40. The antenna according to claim 27, wherein the second conductive strip comprises a geometric shape.

41. The antenna according to claim 27, wherein the second conductive  
20 strip comprise a meanderer line.

42. The antenna according to claim 27 wherein the shorting element is substantially proximate at least one of the first end and the second end.

43. The antenna according to claim 27 wherein the shorting element is located adjacent at least one of the first end and the second end.

44. The antenna according to claim 27 wherein the gap is parallel a  
25 major axis of the ground plane.

45. The antenna according to claim 27 wherein the gap is parallel a minor axis of the ground plane.

46. The antenna according to claim 44 wherein the gap also is parallel a minor axis of the ground plane forming an L shape.

47. The antenna according to claim 27 wherein both the shorting element and the feed tab are located proximate the first end.

5 48. The antenna according to claim 27 wherein both the shorting element and the feed tab are located proximate the second end.

49. A multi band antenna, comprising:

a ground plane;

a first radiating element comprising a first conductive strip, the first  
conductive strip having a radiating edge opposite a non-radiating edge and a first  
5 end and a second end, the first conductive strip is formed into a loop such that  
the first end and the second end form a gap;

a second radiating element comprising a second conductive strip arranged  
such that a portion of the second radiating element resides internal to the loop  
formed by the first conductive strip;

10 a feed tab;

a first shorting element connecting the first radiating element to the  
ground plane, the first shorting element resides on the non radiating edge of the  
first radiating element;

a second shorting element connecting the second radiating element to the  
15 ground plane, the second radiating element not being directly connected to the  
first radiating element forming a parasitic element to the first radiating element;

the second shorting element is drawn through the gap formed by the first  
radiating element;

the first shorting element is generally in the proximity of at least one of  
20 the first end or the second end;

50. The antenna according to claim 49, wherein a majority of the  
second radiating element resides internal to the loop formed by the first radiating  
element and the shorted parasitic element resides proximate the gap formed by  
the first radiating element.

25 51. The antenna according to claim 49, wherein the second radiating  
element comprises a plurality of inner radiating elements.

52. The antenna according to claim 49, wherein the second radiating element resides substantially adjacent the non-radiating edge of the first conductive strip.

53. The antenna according to claim 49, wherein the ground plane is  
5 separated from the first radiating element and the second radiating element by a dielectric space.

54. The antenna according to claim 53, wherein the dielectric space is at least one of air and a dielectric carriage.

55. The antenna according to claim 49, further comprising at least one  
10 capacitive loading plate, at least one shorting post, and at least one matching stub.

56. The antenna according to claim 55, wherein the at least one capacitive loading plate resides on the radiating edge of the first conductive strip.

57. The antenna according to claim 55, wherein the at least one  
15 shorting post resides on the non radiating edge of the first conductive strip.

58. The antenna according to claim 55, wherein the at least one matching stub resides on the radiating edge of the first conductive strip.

59. The antenna according to claim 49, wherein the loop formed by the  
20 first radiating element is one of a geometric or irregular shape.

60. The antenna according to claim 55, wherein the geometric shape is at least one of a rectangle, a square, a circle, an oval, an ellipse, and a polygon.

61. The antenna according to claim 49, wherein the first conductive strip comprises a plurality of widths.

62. The antenna according to claim 49, wherein the second conductive  
25 strip comprises a geometric shape.

63. The antenna according to claim 49, wherein the second conductive strip comprises a meanderer line.



64. The antenna according to claim 49 wherein the first shorting element is substantially proximate at least one of the first end and the second end.

5 65. The antenna according to claim 49 wherein the first shorting element is located adjacent at least one of the first end and the second end.

66. The antenna according to claim 49 wherein the gap is parallel a major axis of the ground plane.

67. The antenna according to claim 49 wherein the gap is parallel a minor axis of the ground plane.

10 68. The antenna according to claim 66 wherein the gap also is parallel a minor axis of the ground plane forming an L shape.

69. The antenna according to claim 49 wherein both the shorting element and the feed tab are located proximate the first end.

15 70. The antenna according to claim 49 wherein both the shorting element and the feed tab are located proximate the second end.

71. An internal antenna for a wireless device, comprising:
- a ground plane;
  - means for radiating at least one resonant frequency, wherein the means for radiating comprises at least one loop antenna having a gap and operating at a
  - 5 quarter wavelength;
  - means for separating the ground plane from the means for radiating;
  - means for supplying power to the means for radiating;
  - means for shorting the means for radiating to the ground plane; and
  - means for tuning the means for radiating.